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ABSTRACT

The increased interest in reading comprehension by researchers in fields other than reading education is noted in this paper. In addition, the concerns of the new researchers in reading are described, some of the terms they are using are explained, and the implications of their findings for reading instruction are explored. The interests of researchers from fields such as linguistics, psychology, and artificial intelligence are noted in the areas of the relation of reading comprehension to schemata, the differences between spoken and written discourse and the particular difficulties inherent in written discourse, and the uses of questioning strategies. Similarities between the information provided from schema theory as it relates to background information or world knowledge and common instructional practices such as directed reading activities are noted, as is the usefulness of schema theory as it relates to story grammar in stories commonly read by beginning readers. The study of written discourse is said to provide more information on readability and to point out the need for reading teachers to know more about anaphoric devices. Finally, the paper reviews studies of questioning strategies, cautions about overgeneralizing from isolated research studies with college students, and emphasizes the need for long-term research and more research with children. (MKM)

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CENTER FOR THE STUDY OF READING

Reading Education Report No. 19

WHAT IS THE VALUE OF THE NEW INTEREST IN READING COMPREHENSION?

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What is the Value of the New Interest in Reading Comprehension?

A quick look through current journals or convention programs is enough to reveal an unprecedented interest in reading comprehension research. More careful scrutiny would show that a large number of the writers and speakers are outside the group commonly referred to as "reading educators." While the latter have hardly been replaced as researchers, it is still true that individuals from fields like cognitive psychology, psycholinguistics, educational psychology, linguistics, and artificial intelligence are writing and speaking often enough to make their presence very apparent. How, it might be asked, have professional educators who have a special interest in reading been responding to this development?

Four Kinds of Responses

According to what I have personally heard, four kinds of responses prevail. One is patient resignation, based on the assumption that the newcomers will soon lose their interest in reading and turn to other areas. The least patient and most vocal in this group specifically charge that many of the "outsiders" are interested in reading only because money for reading research is available and, further, that they have little or no interest in such practical but important concerns as whether or not children learn to read.

In sharp contrast, the most noticeable characteristic of a second group is gullibility. As little as one talk or one report prompts members of this group to accept and propagate a conclusion as being the final truth even when it originates from a speculative conceptualization or from research that was brief in duration, that used a small number of adult subjects, and that lacked sufficient controls. The eagerness of this group to be up-to-date sometimes means that what is propagated is so badly misinterpreted that a researcher would not recognize the finding as being his or her own.

The third response to the current wave of interest in reading comprehension is the one heard most frequently from teachers of children and teachers of teachers. It, too, is cynicism, typically expressed by the contention that a re-invention of the wheel, communicated with unnecessarily technical and obscure terminology, is all that the new breed of researchers is accomplishing. Having heard for many years, for example, that what readers take to a page affects what they are able to take from it, this third group naturally thinks, "So what else is new?" when certain features of schema theory are highlighted. Current discussions of story grammar evoke a similar response, since part of what is said--at least at first glance--seems closely similar to content covered in undergraduate courses in children's literature.

It is possible that the cynicism characterizing this third response may be fostered by the researchers themselves because very few make an

attempt either: (a) to show how what they are doing relates to what was done earlier by reading educators who also were researchers, or (b) to pinpoint exactly how what they are doing and finding goes beyond, or is different from, what their predecessors reported. It is as if reading comprehension research began in about 1970. If this interpretation is correct, greater efforts to connect the present with the past could lead not only to a better understanding of what is now going on but also to far less cynicism about the potential value of the new research.

The fourth response--the one that underlies this paper--is cautious optimism. Michael Strange (1980), after reviewing some current work with comprehension, depicts this position very effectively. He says, "It is not simply . . . old wine in new bottles but rather, finer wine in old bottles and a little new wine, too" (p. 394).

With a few examples, let me show why I think Strange's description is accurate. In the process, some concerns of the new breed of reading researchers will be described, and some of the terminology they use will be explained.

Schema Theory

One highly conspicuous concern is schema theory. As was suggested earlier in the paper, long before it assumed its current prominence, reading methodology courses were teaching that what readers know about a topic affects how well they will be able to comprehend what an author says about it. Since everyone's encounters with print confirm the

dependence of reading on background information (now commonly referred to as world knowledge), even the most rebellious of students probably never objected to that part of the course. Similarly, they were not likely to raise questions when instructors urged them to provide children with varied experiences as a way of building up understandings, concepts, and vocabulary, and to review whatever experiences and concepts are relevant before children read a selection.

Currently, theorists and researchers who subscribe to schema theory are saying the same things--but much more besides as they try to uncover exactly how existing knowledge enters into and influences the reading comprehension process. Let me attempt, therefore, to explain some of what they are saying.

Like so much of the current research with comprehension, that concerned with schemata (the singular form is schema) is interested in memory; specifically, in how knowledge is stored in the mind. Such a focus is naturally bound up with reading comprehension, since both what an author says and what a reader knows must be remembered if what the author says is to be understood.

Because what goes on in the brain cannot be observed directly, how knowledge is stored and then activated for use has to be inferred. For example, how what is known is held in memory and then retrieved during reading has to be inferred from what readers do that is observable; that is, from what they do that is testable.

Based on what research subjects do (most of whom, up until now, have been adults), current theorists and researchers returned to a theory of memory that Bartlett (1932) once proposed in opposition to the belief that memory involves "separate immutable traces that represent exact copies of the original experience" (Armbruster, 1976, p. 12). What was resurrected and is now being further developed is schema theory, whose basic assumption is that what is experienced (learned) is organized and stored in the brain not in a static, unchanging form but in a way that permits modification through further development.[1] Development occurs, the theorists say, when what is known (about an object, an event, a role, a process, or whatever) interacts with what is new but related.

What is already known is called a schema, which is like a concept--and then some.[2] Schemata, according to present beliefs, are arranged hierarchically. A person's schema for something like "sparrow," for instance, is thought to be one part of the more encompassing schema for "bird," which, in turn, is part of the still larger schema for "animal," and so on. Schemata may be thought of, therefore, as being networks of concepts.

For this paper, the pertinent question is, What does schema theory say about reading comprehension?

Schema Theory and Reading Comprehension

One major tenet of schema theory is that comprehension is as dependent on what is in a reader's head as it is on what is printed. Why the theory points to this conclusion is explained as follows.

Each schema is incomplete. (This is especially true of children's schemata.) That is, certain bits of information are missing. What is missing is visualized by theorists as empty slots that are waiting, as it were, to be filled--perhaps by input from written discourse. According to schema theory, if text about sparrows includes what a reader knows as well as information that is new, it not only activates the constituents (pieces of information) of the existing sparrow schema but also (assuming the reader is able to decode the text) fills in one or more of the empty slots. This leads to a conception of comprehension that equates it with "filling the slots in the appropriate schemata in such a way as to jointly satisfy the constraints of the message and the schemata" (Anderson, Reynolds, Schallert, & Goetz, 1977, p. 370). According to this view, comprehension is a process that both depends on and develops schemata.

Developing a schema "from scratch" is difficult, yet that is exactly what a reader must do when an attempt is made to comprehend text dealing with a topic for which he or she has no schemata. Since it <u>is</u> difficult, the reader may or may not succeed. That is, he or she may comprehend the entire text, may comprehend some of it, or may comprehend none of it. "From this follows the possibly banal, possibly profound, conclusion that reading comprehension depends eminently on what the reader already knows" (Bereiter, Note 1, p. 6).

Studies carried out in the framework of schema theory have begun to pinpoint even more specific implications for reading. For instance,

work done by Anderson and his colleagues (e.g., Anderson & McGaw, 1973; Anderson, Pichert, Goetz, Schallert, Stevens, & Trollip, 1976) suggest that both the ability to make an inference and the nature of the inference itself are dependent on a reader's world knowledge. So, too, is the meaning of what is directly stated by an author (Anderson et al., 1977). That even explicit text may be interpreted in a variety of ways is said to reflect the fact that readers respond neither passively nor objectively to print but, instead, construct its meaning themselves with the help both of the author's words and of their own schemata. This portrays reading comprehension, then, as an interactive process in which both text and world knowledge play key roles (Rumelhart, 1976).

Commonly, this way of looking at reading is contrasted with two other interpretations. One portrays it as a top-down process; the other, a bottom-up process.

When reading is viewed as a top-down process, primary importance is assigned to what is in the reader's head (Smith, 1971). Reading is thus seen as being concept-driven in the sense that the reader's knowledge both of the world and of language suggests certain hypotheses, which are tested--that is, confirmed, modified, or rejected--against what is printed. A top-down process is what Goodman had in mind when he referred to reading as being "a psycholinguistic guessing game" (1967).

In contrast, reading viewed as a bottom-up process is text-driven (Gough, 1972; LaBerge & Samuels, 1974). From this perspective, words are

processed individually and sequentially, and meaning derives directly from them. Although what a reader knows is not thought to be unimportant, an author's words are assigned greater importance.

As was mentioned, it is the interactive model of reading that goes hand in hand with schema theory.

Some Reactions to Schema Theory

Since schema theory's explanation of the way information is stored and retrieved is theoretical, one essential reaction is explicit acknowledgement that it is just that--a theory. And even though the growing body of supportive studies is impressive, it must also be remembered (if the theory is correct) that those conducting the research have their own schemata, which are bound to affect how they interpret data. Other researchers with other schemata might assign a different meaning to identical findings. Be that as it may, schema theory applied to reading is attractive because it supports what our own experiences as readers tell us: The more we know before we read, the more we learn when we read.

Not to be forgotten is that the very same experiences point up the need to decode whatever words authors choose to use. Keeping both sides of the reading coin in mind (world knowledge and text) should discourage the emergence of a bandwagon that might have classroom teachers lay aside instruction with something like decoding so that ample time is available for filling children's heads with all sorts of information. As Glass

(1970) has wisely observed, "The maintenance . . . of old knowledge is no less important than the discovery of new knowledge" (p. 325).

With the need for balance in the background, let's move now to possible implications of schema theory for instructional programs in reading.

Possible Implications of Schema Theory for Instruction

What I see as implications right now are not anything teachers have not heard before. For example, schema theory's attention to the dependence of comprehension on prior knowledge suggests the importance of having children recall what they know about a topic before they begin to read about it. But such a suggestion should come as no surprise to teachers, for it has been made many times in textbooks and journals. One graphic portrayal of the suggestion is Stauffer's DRTA (Directed Reading-Thinking Activity), which he proposed at least two decades ago as a way of making reading a more thoughtful and personal experience for children (Stauffer, 1960). A DRTA begins with teachers' encouraging children to speculate about the content of whatever it is they will be reading, using both their own knowledge and clues found in the material--in a title, for instance, or in pictures. From this, questions emerge and, with them, purposes for reading. In discussing the pre-reading part of the outline for DRTA's, Stauffer (1969) cautions, "The reader's questions must reflect his best use of his experience and knowledge" (p. 25).

The very special need to provide children with cognitive readiness for content subject textbooks is certainly supported by schema theory;

and it, too, has been recognized by reading educators over the years. Barron (1969) and Earle (1969), for instance, influenced by Ausubel (1963) and working in association with Herber at Syracuse University, have proposed what is called a structured overview, which cannot help but bring to mind what current theorists say about semantic memory. Teachers who use the overview (a) select from a chapter the most important concepts; (b) select whatever terms are necessary for developing and understanding them; and (c) arrange the terms in a schematic diagram to show how they relate to each other. Pre-reading activities include attention to the terms, the relationships among them, and the concepts.

The point of these few illustrations is that teachers have been urged for a long time to attend to what schema theory indicates is significant for reading comprehension. This is not to claim that teachers have always followed the recommendations (Durkin, 1978-79); however, since we human beings tend to pay greater heed to the advice of non-relatives than to the counsel of family members, it is possible that teachers will now take the same recommendations more seriously as they come from the mouths and pens of cognitive psychologists and linguists.

Teachers who <u>are</u> paying attention to current theory and research are bound to have second thoughts about the way questions often function in classrooms. Typically, they are used not to facilitate comprehension but to assess it (Durkin, 1978-79). With that purpose, most of a teacher's attention goes to deciding whether or not an answer is correct. While some questions do have one right answer, schema theory reminds us that

many have a number of correct answers; and it all depends not only on the text but also on the reader's schemata.

It seems almost needless to point out that schema theory also has implications for those who construct comprehension tests. While global comprehension scores have never had much meaning either for instruction or diagnosis, they clearly have even less when placed within the context of the theory. To say the least, schema theory poses a challenge to psychometricians.

Schema Theory and Story Grammar

Thus far, much that has been said about schema theory probably seems more related to expository discourse--for instance, to a chapter in a social studies textbook--than to narrative prose. If that is so, it is time to turn to what is called story grammar.

Story grammar has to do with the way stories are put together, just as sentence grammar has to do with the way sentences are constructed. As with sentences, stories are seen to have both syntactic elements (e.g., setting) and semantic content (e.g., information about the locale and time of the story). Whereas content varies from one story to another, the syntactic elements do not--at least not in well-developed stories.

During the past decade or so, a number of psychologists have turned to stories as a possible instrument for illuminating exactly how human beings process language. What these researchers are doing with stories

and subjects' recollections of them can thus be characterized as an attempt to understand understanding within the framework of schema theory.

As earlier parts of this paper pointed out, there is consensus among theorists working in that framework about the general nature of the way knowledge and understanding are acquired. That is, agreement exists that they are the product of a reciprocal interaction between a person's schemata and the information in a new event. When stories function in research as a new event, the details of their structure (as well as their content) must be known. Such a requirement prompted psychologists to try to identify the basic elements in stories; resulting from their efforts is the birth of a number of story grammars.

One of the most frequently mentioned grammars is what Stein and Glenn (1979) have proposed. In its most abbreviated form, their grammar identifies setting and episode as the major components of a simple story. Setting introduces the leading character and provides background information. Episode is more complex and includes an initiating event, a response, an attempt to satisfy a goal, a consequence, and a reaction. Figure 1, taken from the report of a study by Nezworski, Stein, and Trabasso (1979) in which the Stein-Glenn grammar was used, illustrates a single-episode structure and, further, how a story grammar functions as an analytic tool.

Insert Figure 1 about here.

Bruce (1979) claims that what existing story grammars fail to capture are characters' interactive plans and beliefs and the social setting in which they occur. He also stresses that since something like a character's intentions may have to be inferred, correct and developed schemata are essential if a story is to be correctly interpreted. Bruce (1978) effectively demonstrates this by comparing how two children retold a story they had read about a fox and a rooster. One feature of the more successful comprehender was a correct schema for fox-in-a-fable: clever and deceitful but often not sufficiently clever. "Schemata like this," Bruce observes, "allow a reader to cope with the otherwise unmanageable mass of information found in stories" (p. 465).

What is especially effective about the analyses now being made of stories is the way they pinpoint how intricate a "simple" story really is. Research findings, therefore, may be headed in the direction of raising a question about the traditional use of stories as teaching material for beginners in reading who have major shortcomings not only in their ability to deal with print but also in their schemata. An analysis like that made by Bruce (1978), for instance, causes one to wonder, not why children have trouble comprehending stories, but rather, why they do as well as they do.

According to current theory, some children do well because they have a schema for "story" (that is, an internal representation of "story") that facilitates the encoding, storage, and retrieval of story information.

If the elements of a given story do not conform to the schema, or if the schema itself is lacking or is poorly developed, comprehension suffers. Within this framework, then, comprehension problems may stem from flaws in an author's writing as well as from limitations in reading ability.

Unlike some of the other current work with comprehension, much of the research being done with stories uses children of various ages as subjects. This should allow it to shed light not only on the comprehension process but also on developmental differences in the ability to comprehend stories. If subjects are selected from a variety of socioeconomic backgrounds and also include bilingual children, improved understanding of how differences in world knowledge affect comprehension would be a possibility, too. One result might be guidelines for instruction and also for writing and selecting appropriate instructional material.

Comparisons of Spoken and Written Discourse

In addition to analyzing the structure and content of stories, psychologists and linguists have been examining other features of text that may influence comprehensibility. One such effort has concentrated on comparisons of spoken and written discourse (e.g., Rubin, 1977; Schallert, Kleiman, & Rubin, 1977). Since it is differences between the two that restrict direct contributions of oral language competency to reading, they have been of special interest. Differences that suggest what reading instruction needs to focus on will now be reviewed. As will be seen, some pertain to the medium, whereas others pertain to the message.

Spoken Language

As both research and experience tell us, spoken language is not always marked by elegantly constructed sentences. Consequently, listeners often have to contend with false starts, abandoned sentences, repetitions, and the like. Why all this may still be easier to understand than a writer's carefully assembled sentences is accounted for by other characteristics of spoken language.

To begin, the syntactic units of speech (e.g., a phrase) are segmented with pauses (Henderson, Goldman-Eisler, & Skarbek, 1965). Apparently, listeners depend on these temporal cues, for when they are distorted, comprehension suffers (Huggins, 1978). Listeners are also helped by intonation and stress (referred to as prosodic features of oral language) and by facial expression, gestures, eye movements, and pointing. All this is to say that speakers work hard to get their message across.

What helps them succeed is the use of words whose meanings are likely to be known to the listener. Allowing for such use is the fact that the speaker's message is often concerned with concrete, everyday objects, with shared experiences, with the immediate environment, and with a time period that is familiar to both speaker and listener. Among other things, these characteristics make it easy for the listener to know what the referents are for such potentially ambiguous words as now, he, this, and here. Identification of referents is also helped by the

prosodic features of oral language. For example, saying "he" with special stress may be all that is needed to specify just who he is.

Written Language

Whereas both linguistic and extralinguistic factors facilitate communication when the medium is spoken discourse, many characteristics of written discourse complicate it. Even though written sentences are usually constructed with care, for instance, their syntax tends to be complex--certainly more complex than that of spoken sentences. In addition, their content is likely to be not only more dense but also less familiar.

While writers are hardly able to confine themselves to familiar content and simple sentences, they can and do assist readers with explanations and illustrations, and, in the area of graphic aids, with paragraph indentation and punctuation. Although marks like commas and periods should help with the segmentation that is required for communication, readers are on their own in using them. It is not surprising, therefore, that studies of beginning readers' problems identify failure to organize text into phrasal units as one deficiency (Kolers, 1975; Levin & Kaplan, 1970). This failure sometimes continues, for it has been identified as one of the common characteristics of poor comprehenders (Golinkoff, 1975-76).

Implications of Differences

Even the few differences between spoken and written language that have been mentioned have implications both for the way we think about

reading and what we do to teach it. First of all, they hardly support the contention that reading ability is no more than the ability to comprehend spoken language plus the ability to decode (Fries, 1962). They thus raise a question about the related contention that the only new task for beginners in reading is to learn to translate printed words into their spoken equivalent.

Clearly, one additional task indicated by differences in spoken and written discourse is the need for beginners to learn about punctuation marks and their implication for deriving meaning from text. Equally clear is the need to become acquainted with, and even accustomed to, the styles of written language. What this underscores, of course, is the importance of what parents and teachers have always been urged to do: read to children. In the light of current work with comprehension, reading to children emerges not only as a means for bridging the gap between spoken and written language but also as a way to (a) develop a schema for "story," (b) expand vocabularies, and (c) add to children's knowledge of the world.

In theory, the oral reading done by children themselves should also help bridge the gap between spoken and written language. However, the oral reading that is often heard in classrooms tends to be a halting, word-by-word rendition of a text that manages to obscure both inter-word relationships and syntactic units (Durkin, 1975, 1978-79). Although the children's attention is called to features like intonation and stress,

it is typically done in a way that turns the oral reading into an elocution exercise in which the overriding concern is the audience. "The erroneous portrayal is undesirable because it could inhibit young readers from arriving at the understanding that reading is not saying something to another but is, instead, getting something from another" (Adams, Anderson, & Durkin, 1978, p. 23).

Readability

If readers are to get something from written text, its difficulty must not overtax either their knowledge of the world or their reading skills. The difficulty of text--usually referred to as its readability--is something that reading educators have studied for close to 50 years (e.g., Dale & Chall, 1948; Gray & Leary, 1935; Spache, 1953). One result is readability formulas that use information about variables like vocabulary and sentence length to predict readability (Klare, 1974-75). Words of high frequency and short sentences are, according to the formulas, signs of easy material.

Questions About Readability Formulas

Almost as old as the readability formulas are doubts about their ability to yield accurate information. And questions continue to be raised, spawned now by the new wave of interest in comprehension. The importance that schema theory assigns to world knowledge, for instance, makes it natural to wonder about formulas that fail to consider what a

reader knows about the content of a passage, and, more specifically, what he or she knows that may or may not allow for necessary inferences.

The need to make inferences enters into other questions about the common use of sentence length as a variable in readability formulas. In this case, the concern stems from recent studies (e.g., Irwin, 1980) in which it has been shown that a short sentence may be more difficult to process than a longer one because it requires a reader to make an inference about unstated information. That this is so can be seen in the following sentences:

Add boiling water to the dry ingredients.

After boiling the water, add it to the dry ingredients.

In a slightly different way, the sentences below also show how short sentences may require an inference and thus may be more difficult to process than longer ones.

When John fell, he hurt his knee.

John fell. He hurt his knee.

Adaptations of Text

What happens to sentences when publishers attempt to reduce the difficulty of material in order to make it suitable for children was one concern of a study recently conducted by some linguists (Davison, Kantor, Hannah, Hermon, Lutz, & Salzillo, 1980). Theirs is an important focus, since those responsible for preparing basal readers commonly use "simplified" versions of stories.

While being quick to say that "adaptors do not follow readability formulas slavishly" (p. 5), Davison et al. still concluded that "vocabulary lists [of high-frequency words] and restrictions on sentence length and passage length are often given primary importance at the expense of other factors which no one would deny are related to readability" (p. 5). Additional factors identified by the researchers include the structure of sentences, the logical connections between sentences and clauses, and the coherence of topics--all of which, the researchers point out, have no objective measurement.

As current researchers continue their work with text analyses, it becomes increasingly clear that we are only beginning to understand the true nature of readability. Meanwhile, what we ask children to read may be inappropriate because it is either too easy or too difficult.

Anaphoric Devices

One possible source of difficulty that is not taken into account in current readability formulas is what linguists call anaphoric devices. In the context of both spoken and written discourse, anaphora (the singular form is anaphor) can be thought of as a means for avoiding repetition and, as a result, reducing what is stated. How the two goals may be realized is illustrated below with the help of a common kind of anaphor, a pronoun:

Joel tried to open the door, but it was locked.

While the sentence above does demonstrate the two positive features of anaphora, it is not especially effective in indicating that what a speaker or writer omits must be added--that is, inferred--by the listener or reader. Some of the kinds of inferences that may be required are described in a survey of linguistic research on anaphora (Nash-Webber, 1977). A little of what is described will be summarized here with the help of sentences plus comments about the mental exercises involved in comprehending them.

Examples of Anaphora

That some anaphoric expressions are ellipses[3] is shown in the first illustrative sentence:

Since nobody volunteered to do the dishes, grandma did Ø.

Why readers are viewed as being active participants in the job of getting meaning from print is demonstrated by the sentence above, since comprehending it calls for adding to the end "volunteer to do the dishes." Not shown, however, is that many anaphora require a reader to make connections between sentences. For example:

The room was immaculate. Even the walls Ø had been washed.

With the above, the mental addition of "in the room" completes the message intended by the writer.

How readers may have to add to what is stated in more complex ways is demonstrated in the next three sentences. The first also shows that an adverb may function as an anaphor.

I've shoveled the snow and scraped the ice. Park here.

On the day that Marie cut her arm, her brother broke his ankle. It was just too much for their mother.

Paul drives a blue Chevrolet. That's what I bought, but I wanted a red one.

In the first example, a piece of ground that is free of snow and ice must be mentally substituted for here if a very brief sentence is to be understood. In the next example, understanding requires that it be replaced by the two previously mentioned events. The third example demands even more complex substitutions. In the case of that, a blue Chevrolet is the referent but not the one mentioned in the first sentence. With one, a Chevrolet is the referent but, again, it is not the blue one in the first sentence but, rather, a different, red one.

That readers must be mathematicians--at least when they encounter certain anaphora--is illustrated in two other sentences:

Joey gave each of his three friends an apple. They thanked him for them.

Mr. Brown met his two sons at the ballpark. They went in immediately to find seats.

The next illustrative sentence reinforces the fact that short sentences are not necessarily "simple"--at least not when an anaphor is present:

Jeanne did not marry a banker. He is an accountant.

In this instance, an inference allows a reader to know that he refers not only to an accountant but also to the man who is married to Jeanne.

Two other sentences show the need for other kinds of mental exercises:

> Dad took the boat out to get a fish. We hope to have it for dinner.
>
> His parents live in a condominium. They are very suitable for retired people.

In the first example, it refers to a specific fish (the one dad might catch), not to the hypothetical one in the first sentence. The plural they in the second example helps to show that the referent is not the parent's specific condominium but is, rather, a class of objects known as "condominium."

Probably enough examples of anaphoric devices have now been given, first, to explain what they are and, second, to show some of the manipulative processes that are required for determining intended referents.

Significance of Anaphora for Linguists and Cognitive Psychologists

Anaphora are an attractive focus for study to such academicians as linguists and cognitive psychologists for the very reason that processing them may be difficult: Their referents are only suggested in a text. That they are not explicitly communicated indicates that language users must themselves supply referents using both what is in the text and what is stored in their head. From this perspective, the study of anaphora can be seen as fitting in well with the current interest in learning how cognitive abilities like inferencing are acquired and, further, how they function.

Significance of Anaphora for Reading Educators

Even the simplified account of anaphora that has been presented should be enough to suggest that they are apt to cause comprehension problems for children. More specifically, ". . . if a reader does not recognize an expression as anaphoric, or if he or she is unable to handle it as the writer intended, then there is no way that he or she can build up a correct model of the text" (Nash-Webber, 1977, p. 4).

That instructional programs give anaphora the kind and amount of attention that their frequent appearance and difficulty warrant is doubtful. An examination of basal reader manuals, for instance, has shown that surprisingly little space is assigned to anaphora (Durkin, Note 2). Whether this reflects too little knowledge about their pervasiveness in our language or, perhaps, insufficient appreciation of their potential difficulty, is not known.

Meanwhile, some research into children's ability to deal with anaphora in written text has been undertaken (e.g., Barnitz, 1980; Bormuth, Manning, Carr, & Pearson, 1970; Richek, 1976-77). To illustrate what is being done and has been found, a few details about Barnitz's study will be described.

Research with Anaphora

Barnitz's (1980) research concentrated on children's ability to handle the pronoun it in a variety of contexts that were organized under three categories. The first, labeled Referent Type, divides into contexts

in which (a) the referent for it is a noun or noun phrase, and (b) the referent is a clause or sentence. For example:

> John and his father wanted to buy a large train set because it was on sale.
>
> Mary rides her skateboard in the busy street, but Marvin does not believe it.

The second category, Reference Orders, covers contexts in which (a) it comes after its referent, and (b) it precedes the referent. The two sentences cited above exemplify the first subdivision; the sentence below exemplifies the second.

> Because it was on sale, John and his father wanted to buy a large train set.

Referent Distance is the third category. In this case, the concern is contexts in which (a) it and its referent are in the same sentence, and (b) it and its referent occur in separate sentences. All the illustrative sentences that have been given thus far are examples of the first subdivision, whereas the second is illustrated in the sentence below:

> John Boy and Mr. Walton went hunting for the rattlesnake in the woods. Mr. Walton was almost bitten by it.

It was hypothesized in the study that, for each category, the following would be easier to process:

Type: referent is noun or noun phrase

Order: referent precedes anaphor

Distance: referent and anaphor are in same sentence

Findings validated the first two hypotheses but failed to confirm the third. According to Barnitz, one possible reason for the lack of confirmation is that even though the pronoun and its referent were in the same sentence in the experimental materials (brief stories), they did not always occur in the same clause.

Some Conclusions about Anaphora

Some details of Barnitz's study were reported for the purpose of demonstrating to those who are not researchers that learning about children's ability to process anaphora will not be an easy or a quick process. Yet to know about it is important if instructional programs are to do a better job with an aspect of text structure that may contribute to comprehension problems.

Meanwhile, what is needed right now from linguists is information (synthesized and communicated in a way that is comprehensible to the nonlinguist) about the kinds of anaphora that occur in English. That would provide guidance not only for researchers but also for those who teach children, who teach teachers, and who prepare instructional materials.

Questions and Comprehension

One more facet of current work with comprehension will be considered, namely, studies aimed at learning whether answering questions about a piece of prose will enhance what a reader learns. In some cases, how

readers respond to questions is also used by researchers attempting (a) to understand how information is processed and (b) to identify differences between good and poor comprehenders.

Before reviewing a few findings from these studies, let me first identify some of their limitations and flaws. Although negative, beginning this way seems desirable because the tendency to overgeneralize the meaning of research data has been especially widespread for this topic.

Limitations of Studies

To begin, existing findings can hardly be applied to everyone, since the majority of subjects asked to respond to questions about text have been adults--often, readily accessible college students. That what is learned from the use of questions with such subjects is directly applicable to children is indeed questionable.

Placing further limitations on the general applicability of the research in this area is the common use of expository discourse. The notion that the effect questions have on what is learned from, let's say, a chapter in a psychology textbook is identical to the effect they would have were a story being read, must also be questioned.

The nature of the questions themselves--they are commonly called adjunct questions--is still another factor that needs to be taken into account. When researchers report on the kinds of questions they used--and not all tell what was used--the questions are commonly of a type

that calls for short answers taken directly and verbatim from the text. While simple recall questions do provide data that are easy to analyze, using only one kind of question places further limitations on the general value of findings.

What also cannot be overlooked in these studies is that subjects usually answer questions right after they've read a passage. While what is recalled immediately is important to know, what readers continue to remember is important, too. Yet the research done thus far never deals with the kind of delayed recall that is both meaningful and desirable in the real world. (After all, if something is worth remembering, it is important to know what to do to help children remember it for more than a day or a week.) Nor has the research been of a duration that allows a researcher to learn whether the effects of questions change with continued use. As Faw and Waller (1976) point out, "Long-term studies are not popular in most areas of psychology, and prose learning is no exception" (p. 713).

Keeping all these limitations in mind, let's turn now to what has been reported about the effects of questions.

Questions: A Means for Understanding Information Processing

That readers learn more--that is, recall more--when questions are posed about the content of text than when no questions are used is one consistent finding. Presumably, questions have a positive effect because

they prompt a reader to pay closer attention to the content. Such an effect is the reason questions are sometimes discussed in the context of mathemagenic activities. Mathemagenic is a term coined by Rothkopf "to refer to attending phenomena" because they "give birth to learning" (1970, p. 325).

Other researchers (McGaw & Grotelueschen, 1972) have reported data suggesting that questions inserted into a passage promote what they call "backward review" and "forward shaping." Still others (Rickards & Hatcher, 1977-78) have hypothesized that certain kinds of questions help readers assimilate new material in relation to what is already known. Such a function is like what Ausubel proposed as being the value of advance organizers (Ausubel, 1963).

With the help of computers, several more studies have identified what might be called focusing behavior as a variable that relates both to adjunct questions and to what a reader learns by trying to answer them (Alessi, Anderson, & Goetz, 1979; McConkie, Rayner, & Wilson, 1973; and Reynolds, 1979). Together, findings from these studies suggest that a question increases inspection time and the cognitive effort that a reader gives to what is considered relevant for his or her purpose--in this case, answering the question.

Questions: A Means for Augmenting What is Learned

Researchers concerned with questions as a possible means for improving prose learning have placed them both before and after relevant

passages. A frequently quoted study by Rothkopf (1966), whose findings are somewhat typical when subjects are adults, has been summarized by Anderson and Biddle (1975):

> College students read a twenty-page . . . selection . . . on marine biology. Two questions were asked either before or after each two- or three-page passage. The questions were of the completion type requiring a one- or two-word answer. People who received adjunct questions did substantially better than controls on repeated criterion test items[4] regardless of the position of the questions. . . . People who answered adjunct questions after, but not before, the relevant passage also showed a small but significant advantage on new test items (p. 91).

Researchers who have conducted studies similar to the one just summarized have especially underscored the effects of question placement on learning. Even though differences in what is learned (based on answers to simple recall questions) is sometimes very small, the following observations have still received widespread attention:

(a) Questions posed before a passage is read increase what is learned about content that relates to the questions.

(b) Questions placed after the relevant passage increase what is learned about content that relates to them and, in addition, increase what is learned about different content.

The usual explanation for differences in the effects of pre- and post-questions is that the latter do not circumscribe a reader's attention in the way that the former do.

Questions: Implications of the Research for Instructional Programs

Even though a large number of topics that have won the attention of current researchers are omitted from consideration in this paper, questions and their effect on learning from text is considered because findings on this topic have generated misinterpretations which, if taken seriously by reading educators, are likely to have anything but positive effects on instructional programs. "Don't ask children questions before they read because that will curtail what they'll learn" is a prime example of what I believe to be an unfounded, premature interpretation of the data. Unfortunately, it also is a common one in spite of the limitations of the research.

Not taken into account by such an interpretation are more recent studies in which (a) children are subjects and (b) more than simple recall questions are asked. In reviewing the more recent work, Wilson (1980) reached the conclusion that findings are highly contradictory. "One notes," she writes, "that the majority of studies with public school pupils have found no significant results for question placement" (p. 100).

Since the bulk of the research done thus far does suggest that questions (regardless of their placement) foster increased learning, posing them to children appears to be one device for promoting comprehension. However, since the same research indicates that questions have this positive effect because they encourage readers to give more time and concentrated attention to what is related to answering them, anyone who asks questions should feel obligated to choose only those that deal

with important content. As Frase (1977) has observed, questions "may lead a reader to stray from, as well as move toward, desirable learning outcomes" (p. 43).

To those of us who teach, then, the research seems to be saying, ". . . if we wish to produce better comprehenders, we must begin by becoming better questioners" (Hansen, 1977, p. 65). Some time ago, findings from an extensive, year-long study by reading educators (Wolf, King, & Huck, 1968) made the same point: The level of children's responses closely mirror the level of the questions posed by teachers.

In Conclusion: Some Personal Reactions

The review of research that was done to write this paper prompted a number of reactions, some of which have already been mentioned. One unstated but overriding reaction is a clearer, more explicit recognition of the amount of inferencing that is required by the nature of what is central to so much of the research: the human mind. A related reaction, therefore, is restlessness, since it is so easy for inferences to be wrong.

Stating such reactions here is not done for the purpose of casting doubt on the value of what is being attempted by cognitive psychologists, linguists, and others. Rather, it reflects the conviction that the researchers and the consumers of their reports need to be very careful--more careful than some have been--about making distinctions between

hypotheses, conjectures, and inferences on the one hand and well-established facts on the other.

Related to this is the tendency of current researchers to refer in their reports to certain studies in a way that implies they prove whatever point is being made. However, to read the original reports of the studies runs the risk of learning that they may be sufficiently flawed or limited in scope to prevent them from proving anything.

All this was reminiscent of graduate school years because professors of reading were also quick to cite studies to back up their recommendations. If the topic was reading readiness, for instance, it could be taken for granted that the research reported by Morphett and Washburne (1931) would be referred to as offering proof that a mental age of about 6.5 years is a requirement for success with beginning reading. Not easy to forget is the shock that was experienced when the report itself was read and the limitations of the research were seen. A little of the same feeling developed while reviewing some of the current work with comprehension. To keep us all from ending up in the undesirable position of thinking that we know more than we really do, it would be helpful if writers of research reports used the citation and the interpretation of another writer only when they themselves have read the report and agree with the interpretation. Otherwise, studies may exert influence even when their quality is poor.

Additional observations about the current research brought to mind the analysis of studies of beginning reading carried out by Chall (1967).

Although looking at an entirely different body of research, she found what I found: too many isolated studies; too little replication; practically no long-term studies; and too much unquestioning allegiance to one position. Because of the similarity, the words of Santayana kept coming to mind as reports were examined: "Those who cannot remember the past are condemned to repeat its mistakes."

With such a prediction in the background, it was only natural to wonder why there wasn't more evidence in the examined reports of attempts to uncover what others in a different area of specialization--for instance, reading education--might have done previously on the same or a related topic. Although it is only natural for someone like a cognitive psychologist to want to communicate with his or her own colleagues, current work with reading does need to be placed in a setting that recognizes what was done and learned in the past. Otherwise, the special contribution of the new research may not be evident.

The desire to communicate with one's own colleagues has another drawback--at least for those who are interested in moving from research data to possible implications for instruction. It fosters studies that tell us more than we need to know for our purposes. Take the case of anaphora as an example. What linguists know about them has important implications for instructional programs; however, linguists speaking to other linguists are more likely to pursue analyses that are even more technical and minute than to work on syntheses of what is already known. Yet it is the syntheses that could be helpful to reading educators.

What this suggests is the need for more cooperation and communication between academicians and reading educators. I propose that the latter could help not only by participating in research (starting at the planning stage) but also by offering reminders about education, classrooms, and children. Since so much of the current work with comprehension concentrates on increasing learning from prose, let me use that topic to illustrate some reminders.

Education

Education is primarily concerned with long term effects; therefore, researchers need to examine the effect over time of whatever type of intervention they choose to study.

Related to this is the fact that transfer is at the core of effective education. While it is helpful to know what increases learning from prose, it is necessary to know, too, what children do with a piece of text when they are on their own, both when they have something like questions available and when they do not. This means that researchers who study the effect of adjunct questions or structured overviews should not think that their work is done when positive effects are found. Instead, they should next try to learn whether there is any carry-over to independent reading. If none is found, the next question is, What can be done to promote transfer?

Classrooms

With all that has to be done in classrooms, teachers can hardly use everything being recommended for increasing learning from prose. They need answers, therefore, to questions like: Which of the various treatments increase learning the most? Is there a differential effect depending on kind of learning and kind of text?

What needs to be investigated, too, is whether an intervention used by a researcher with subjects will have the same effect when it is used by a teacher with students. This clearly calls for studies that are done in classroom settings.

Children

Anyone who knows about children in classrooms is keenly aware of the great differences among them. Before any research findings can be generalized, therefore, systematic replication of studies using subjects who vary in age, intelligence, reading ability, and socioeconomic background is essential. Persistent efforts to try to learn why differences in findings occur when different subjects are used are also necessary if an understanding of all the data being collected is ever to be achieved.

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Footnotes

[1]Trace theory and the conception of brain function as being static were natural for the 1930s since, at the time, the telephone switchboard was used as a model for understanding the mind. With the computer as the current mechanical model, it is equally natural now to find widespread acceptance of schema theory.

[2]Frame is sometimes used as a synonym for schema (Minsky, 1975).

[3]An ellipsis is an omission of one or more words from a sentence.

[4]This refers to the same questions asked after the entire passage was read.

Figure Caption

Figure 1. An analysis of a story.

The Tiger's Whisker	
Setting	Once there was a woman who lived in a forest.
Initiating Event	One day she was walking up a hill and she came upon the entrance to a lonely tiger's cave.
Internal Response	She really wanted a tiger's whisker and decided to try to get one.
Attempt	She put a bowl of food in front of the opening of the cave and she sang soft music. The lonely tiger came out and listened to the music.
Consequence	The lady then pulled out one of his whiskers and ran down the hill very quickly.
Reaction	She knew her trick had worked and felt very happy.

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